IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of:	)	
	)	
Kensuki FUJIWARA	)	
	)	
Serial No. : 09/280,518	)	Group Art Unit : 2861
	)	
Filed : April 5, 1999	)	Examiner : Hai Chi PHAM

For : Laser Intensity Adjusting Method

APPEAL BRIEF

(1) Real Party in Interest

The present application is assigned to Kyocera Mita Corporation, a corporation of Japan having a place of business at 328, 1-chome, Tamatsukuri, Chuo-ku, Osaka 540-8585, JAPAN.

(2) Related Appeals and Interferences

To the best of the undersigned's knowledge, no other appeals or interferences will directly affect, will be directly affected by, or will have a bearing on the Board's Decision in this appeal.

(3) Status of Claims

Claims 6-13 remain pending in the application. Claims 6-13 are under appeal. These claims are attached to this Brief, as required by 37 C.F.R. §1.192(c)(9).

(4) Status of Amendatory Papers

Papers responsive to numerous office actions have been submitted during the course of prosecution of this application. All of these papers, with the sole exception of that submitted on December 15, 2003, have been entered. The December 15, 2003 Response was refused entry. The other submitted papers, entered and of record, are Appellant's Amendment of June 29, 2000, Amendment of December 13, 2000, Response of July 26, 2001, Response of January 9, 2002, Response of June 18, 2002, Preliminary Amendment (with CPA) of December 17, 2002, Response of April 23, 2003, and Submission/Response (with RCE) of January 14, 2004.

(5) Summary of Invention

Claim 6 defines Appellant's method as a laser intensity adjusting method. This method is directed to adjusting a maximum intensity of a laser exposure mechanism that radiates laser light to a photoreceptor (of an image forming machine). Appellant provides an example of such a machine in Figure 4, with a very prominent depiction of photoreceptor 1. The purpose of Appellant's method is to adjust the laser intensity such that the potential of the photoreceptor, once exposed to the laser light, reaches a predetermined set potential. (See Appellant's specification, page 1, lines 5-15.) "Residual" potential correction is achieved by the claimed method. (Specification, page 2, lines 2-5) Residual potential correction is a second process performed after "dark" potential correction. (Specification, page 10, second full paragraph.)

Because Appellant's overall process uses a dark potential correction method that is similar to that in the prior art, claim 6 omits description of dark correction and immediately proceeds to a description of his inventive residual potential correction. Such residual potential correction begins with a "first potential detecting step". It continues with a "second

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potential detecting step". Thereafter, Appellant's claimed laser intensity adjusting method concludes with a "setting" step.

As seen from claim 6 and as indicated immediately above, Appellant's method performs two different forms of residual potential detection in order to capture the optimal intensity value. Appellant's first, or coarse, potential detecting step provides a "first" (relatively wide) range of laser intensity values according to a (relatively large) step interval. The first step continues with exposure on the photoreceptor surface at each such intensity to obtain a plurality of exposed patch portions, and then detection of the potential at each such patch portion to determine whether the residual potential in any of the patches is equal or substantially equal to the preset desired potential. (Claim 6, second paragraph.) If a match is found, the process is stopped and the laser intensity corresponding to the patch with the equal or substantially equal potential is adopted as the final maximum intensity. (Specification, page 11, lines 15-22.)

According to his exemplary, preferred embodiment, Appellant's first potential detecting step is carried out with the coarse laser intensities P_{MAX} x (920/1023), P_{MAX} x (940/1023), P_{MAX} x (960/1023), P_{MAX} x (980/1023), and P_{MAX} x (1000/1023) according to an interval of P_{MAX} x (10/1023). (See paragraph bridging pages 10 and 11, and step S3 of Appellant's Figure 1). If no match is detected, this sets the stage for (possible multiple repetitions of) the Appellant's second, or fine, potential detecting step wherein the patch found with the potential closest to the desired potential during the coarse detection step is inspected further. (Specification, paragraph bridging pages 11 and 12, and claim 6, third paragraph.)

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The fine detecting step examines the intensity value discovered during the coarse

potential detecting step at smaller interval steps in order to much more accurately search for

the desired target intensity value. (Claim 6, second potential detecting step (i).) In this

regard, reference is made to step S7 (Figure 1) in Appellant's preferred exemplary method,

where fine intensity values of namely P_{MAX} x (950/1023), P_{MAX} x (952/1023), P_{MAX} x

(954/1023), P_{MAX} x (956/1023) and P_{MAX} x (958/1023) according to an interval of P_{MAX}

x (2/1023) are calculated. (See Specification, page 12, lines 5-12.) The photoreceptor

surface then again is exposed at these finely-divided intensities and the potential at each

patch is detected. (Claim 6, second potential detecting steps (ii) and (iii).) Appellant's

method eventually will capture the desired value because the fine detection step processing

is repeated until the value is captured. (Claim 7.)

During the prosecution of this case, Appellant has come to recognize that while his

claimed method involves a phenomenon that he believes is well known to those of ordinary

skill in this art, such phenomenon may not be so well known otherwise. There is a

propensity for the surface potential of a normal photoreceptor to drift after exposure.

Appellant was confident that those of ordinary skill would be aware of this phenomenon,

and thus he did not discuss it in the present specification. Generally, the photoreceptor

surface potential varies or drifts in dependence upon the position where the potential is

detected. Further, it varies depending upon environmental factors such as temperature and

humidity conditions in proximity to the photoreceptor. Moreover, during repetition of

exemplary steps S4 through S7 (see Figure 1), there will be no assurance that exactly the

same portion of the photoreceptor surface will be exposed by the laser exposure mechanism

during each repetition. This also contributes to variance in the measured potentials, to some extent, during any iteration of steps S4 through S7.

To overcome the potential drift problem, in practice, Appellant uses the same fine laser intensities in repeating steps S4-S7 as were used in the first execution of these steps. In effect, steps S4-S7 of Figure 1, namely steps (i)-(iii) of the "second potential detecting step" of claim 6 are repeated until one of the patches at one of the finely-divided intensities happens to result in the desired potential. When this occurs, advance is made to the "step of setting" further recited in claim 6.

Claim 7 expressly states that the second potential detecting step is repeated until a potential substantially equal to (or equal to) the predetermined set potential is obtained.

Claim 8 describes that the intensity values obtained at the first (coarse) potential detecting step are selected by dividing the predetermined laser intensity value by a first predetermined number.

Claim 9 is similar to claim 8 except that claim 9 pertains to selection of the laser intensity values for the second potential detecting step. These are recited as obtained by dividing the predetermined laser intensity value by a second predetermined number.

Claim 10 defines the predetermined laser intensity value as greater than a suitable maximum intensity.

Claim 11 makes the same limitation regarding the predetermined laser intensity value as claim 10, but depends from claim 9 rather than claim 8.

Claim 12 defines the exposed patch portions as spaced apart from each other on the photoreceptor surface.

Claim 13 depends from claim 12 and further recites that such exposed patch portions are generally rectangular areas.

(6) Issues

The following issue is presented for consideration in this appeal:

Did the Examiner commit reversible error in rejecting, and maintaining the rejection of claims 6-13 under 35 USC §103(a) as allegedly obvious based on "Appellant's Acknowledged Prior Art" (AAPA) in view of Arevalo (U.S. Patent 6,104,986) and further in view of Sugiyama, et al. (U.S. Patent 5,737,665)?

(7) Grouping of the Claims

For consideration on this appeal, claims 6-13 stand or fall together.

(8) Asserted Art

8(a)   AAPA

The AAPA teaches a conventional potential correction technique for adjusting laser exposure intensity in an image forming apparatus. The AAPA, of course, is contained in Appellant's specification and drawings (Figure 1) and therefore references to specification page and line numbers are included herein. The AAPA is specific in describing the technique as involving a first step of dark potential correction (see page 3, beginning at line 12 and step S51 in Figure 5), followed by one or more steps of residual potential correction (see page 4, beginning at line 2). In dark potential correction, the bias voltage of a corona discharger grid is set to an optional value, and then the potential (dark potential) of the photoreceptor surface is measured by a sensor. This step relies upon a linear equation, obtained through prior experimentation, to assess the difference between the measured dark potential and the measured pre-set potential, and then to adjust the bias voltage such that the

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dark potential comes to equal the desired pre-set potential. (See the paragraph bridging pages 3 and 4.)

According to the AAPA, after dark potential correction has been completed, residual potential correction is conducted. During residual potential correction, a maximum laser intensity is set (Figure 5, step S52), and a laser exposure unit is used to expose the surface of the photoreceptor (Figure 5, Step S53). After exposure, residual potentials on the photoreceptor surface are measured (Figure 5, step S54). Another <u>linear</u> equation is used to calculate the laser intensity for the desired pre-set potential. (In addition to steps S53 and S54, see also the corresponding specification description on page 4, from line 2 to line 20.) Appellant has depicted this linear equation with line segment (3) in Figure 6. According to the specification, steps S53-S57 are repeated until the residual potential obtained in step S54 comes to equal the desired pre-set potential. (Specification page 4, lines 12-20.) This results in a point at intensity (1) and potential (2) in the plot of measured potential versus laser intensity in Figure 6. Appellant concedes that, in this way, the AAPA gradually will converge laser maximum intensity to the solution but Appellant still criticizes the AAPA as requiring a large number of iterations and therefore long processing times in order to accomplish the correction. (See paragraph bridging pages 4 and 5.) The AAPA does not describe any additional sources or alternative procedures to this basic technique. The AAPA does not teach or suggest adding another potential step of using a more finely divided range of intensity values in any of its steps S52-S57.

8(b)   <u>Arevalo</u>

Arevalo is directed to a method and an apparatus for <u>phase shifting</u>. Within nine columns of disclosure, not counting the claims, Arevalo devotes one paragraph, about 23

lines, to what Arevalo describes as an initialization algorithm useful in initializing a

phase/amplitude controller. (Column 5, lines 5-14.) Otherwise, Arevalo is consistent in

disclosing and claiming phase shifting devices and methods, methods of providing variable

phase delay output signals, and computer readable media for doing the same. Arevalo does

say that the column 5 initialization algorithm "is not tied to any particular application" at

lines 44-46. Arevalo also includes a flow chart of the initialization algorithm in Figure 4

thereof.

With reference to Figure 4 of Arevalo, the first step (step 402) in the Arevalo method

is to determine the full range of input values. This range is then divided (step 404),

approximately in half, into sub-ranges, and one test point is selected (step 406) from near the

middle of each half. These two test points are then used as input into a phase shifter, the

circuit performance then is measured for each test point (step 408), and the better

performing point is determined (step 410). The half of the range from which the better

performing point came (step 418) is then divided (again step 404) approximately in half, and

two new test points are chosen (repeat step 406) from near the middle of each new and

smaller half. The circuit performance is then measured for each of these new test points

(step 408), and the better performing point again is determined (step 410). This process

continues, with each iteration dividing the range of inputs (step 404) approximately in half,

until the optimal point is determined (steps 412, 414). When the optimal point is

determined, the input is set accordingly (step 416).

8(c)   Sugiyama, et al.

Sugiyama, et al. relate to a color copier, printer, facsimile, or similar image-forming

apparatus. Reference is made to Figure 4 which Sugiyama, et al. describe as showing a test

pattern made up of a plurality of rectangular images. According to the patent, toner density

in the test pattern accurately is read and is considered to correspond to actual toner density.

(9) Argument

The Rejection Under 35 U.S.C. 103(a) Must Be Reversed Because It Fails To Establish *prima facie* Obviousness

The final rejection of claims 6-13 under 35 USC § 103(a), as purportedly obvious

based on the AAPA in view of Arevalo (U.S. Patent 6,104,986), and further in view

Sugiyama, et al. (U.S. Patent 5,737,665) is untenable and should be reversed. The rejection

improperly is based upon hindsight from Appellant's own disclosure, and therefore is not

sustainable.

The rejection is untenable because it improperly combines the AAPA with Arevalo

(and Sugiyama, et al.). To establish a *prima facie* case of obviousness the Examiner must

show how one skilled in the art would have found it obvious to choose elements or concepts

from the various references so as to arrive at the claimed invention without using

Appellant's own disclosure and claims as a guide. Ex parte Clapp, 227 USPQ 972 (BPAI

1985). Like Appellant's claimed invention, the AAPA teaches, to those of ordinary skill in

the art, a potential correction technique for adjusting laser exposure intensity at which to

irradiate a photoreceptor. This is done for an image forming apparatus such as a digital

copying apparatus, a digital printer, or the like. (Specification page 1, lines 5-15.) Further

like Appellant, the AAPA is specific in describing the technique as involving one or more

steps of residual potential correction (after a first step of dark potential correction).

Arevalo, on the other hand, is directed to a method and an apparatus for phase

shifting. Arevalo discusses his inventive phase shifting circuit and procedure in great detail

over the vast majority of the patent's disclosure. The present rejection essentially relies upon

one paragraph of the patent, at column 5, lines 44-67, discussing a "generalized version" of an "initiation algorithm." While Arevalo does say that the initiation algorithm is "not tied to any particular application", Arevalo does not say or in any way suggest that the teaching therein would have any benefit, or any application, in a method of adjusting laser exposure intensity for photoreceptor exposure, in an image forming apparatus. Arevalo has nothing to do with either dark potential correction, or residual potential correction, as taught by the AAPA. Thus, neither the AAPA nor Arevalo contains any suggestion or motivation to lead those of ordinary skill in the art to look to the Arevalo disclosure in improving a potential correction process for an electrophotographic digital image forming apparatus. Therefore, Appellant courteously urges that the asserted combination of the AAPA and Arevalo improperly is based upon hindsight learned from Appellant's own specification. Under Ex parte Clapp, no *prima facie* case of obviousness has been established and hence the rejection must be reversed.

The same conclusion is reached under application of the Federal Circuit's holding in In re Sang Su Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002). To establish a *prima facie* case of obviousness, the Examiner must provide factual support from the cited patents for the proposed modification, and this factual support must be based on objective evidence of record and must establish that the cited patents themselves provide the requisite motivation, suggestion, or teaching regarding the desirability of making the specific combination made by the Appellant. In re Sang Su Lee. However, in the present case Arevalo proposes an initialization algorithm, which in the context of the patent is an algorithm for a phase shifter or a phase/amplitude controller. Nothing in Arevalo would lead those of ordinary skill in the art to attempt to apply an algorithm introduced for

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initializing phase shifters to adjustment in photoreceptor exposure. Nor is there any description in the AAPA to suggest or otherwise motivate looking beyond the AAPA's adjusting process to any such initialization algorithm for a phase shifter. Thus, there simply is no suggestion that any teaching from either the AAPA or Arevalo that a patent directed to phase shifting would be applicable to potential correction in such photoreceptor in an electrophotographic image forming apparatus. Under In re Sang Su Lee, the factual question of motivation is material to patentability, and can not be resolved on subjective belief and unknown authority. In accordance with In re Sang Su Lee, reversal of the rejection earnestly is solicited.

This conclusion is compelled from a more detailed look at the teachings of each of the AAPA and Arevalo. First, consider the problem that Appellant solves with his claimed invention. That is, Appellant determines a potential value along what Appellant recognizes to be a non-linear relationship between laser intensity and residual potential value. The non-linear relationship is shown in Appellant's Figure 3, and also Figure 6. Appellant's objective is to locate this value within significantly shorter processing times than required for the AAPA's conventional method. The AAPA teaches those of ordinary skill in the art to use a linear equation previously obtained through experimentation for both dark and residual potential correction. (Specification, paragraphs bridging pages 3 and 4, and 4 and 5.) A segment along such a linear equation is shown by line (3) in Figure 6.

Appellant does not concede that one of ordinary skill in the art would have combined any of the teaching of Arevalo with the AAPA (indeed Appellant vigorously contests such alleged combination), however for the purposes of argument, Appellant describes the pitfall that such a combination likely would produce. To the teaching of the AAPA, Arevalo

would add assignment of arbitrary lower and upper laser intensity values in order to define a

linear range on segment (3) in Figure 6, which range could include all or only a portion

of the segment. Thereafter, Arevalo's algorithm, applied in setting laser intensities, would

result in division of the range of intensities in half, and the selection of one intensity nearest

the middle of each half-range for use as new intensity input values. The intensity value

corresponding to the better-performing point would be determined and this half of the range

would become a new range whereupon a new midpoint is set therein, and two new test

points are chosen near the middle of each new half-range.

In combination with the teaching of the AAPA, therefore, the Arevalo algorithm

would operate to define progressively smaller ranges along the segment (3) . There

would be no suggestion, however, from either the AAPA or Arevalo, that such a

modification of the AAPA according to Arevalo's algorithm would reduce processing time

to any extent. Rather, due to above-described problems in drift of the potential value, the

AAPA, if modified according to Arevalo may never locate the desired potential. This could

occur when the potential lies on the non-linear curve shown in both Appellant's Figures 3

and 6. This could occur when the potential moves along line (3) to outside the half-

ranges created by Arevalo's method. In either occurrence, Arevalo's algorithm would seem

to place the AAPA process in an infinite loop of dividing the original intensity range into

ever smaller values. This only would increase processing time. It would be an unfortunate

step backward, further complicating intensity correction in image forming machine

photoreceptors. There simply is no teaching or suggestion from either the AAPA or Arevalo

(and none added by the Sugiyama, et al. patent) to carry out Arevalo's algorithm to enhance

processing speed in the AAPA technique, or to locate potential values on any curve other

than a (an experimentally-determined) linear equation as taught by the AAPA. Again for these reasons, the rejection respectfully is urged as untenably based upon hindsight.

Appellant's claimed process, by contrast, avoids the problem of a possible infinite loop caused by potential value drift. This is because Appellant's claimed method simply repeats (the steps S4 – S7 in Figure 1) without further reducing the size of the intensity value interval. This continues until the potential value drifts to coincide with one of the fine intensity values used in Appellant's method. At this point, a match is found and the process terminates. Appellant's process is faster than the AAPA because it goes on to expose the photoreceptor at fine interval laser intensities whereas the AAPA simply repeats exposure and detection at only a course interval of intensities. By making an infinite loop possible, Arevalo does not bring the AAPA to Appellant's invention. A proper *prima facie* case of obviousness cannot be established because it would be "obvious to try". The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device." Ex parte Chicago Rawhide Mfg. Co., 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984). Hence, under Ex parte Chicago Rawhide Mfg. Co., the rejection must be reversed.

Lastly, independent claim 6 requires that in substep (ii), the successive exposing of a surface portion of the photoreceptor surface with laser light corresponding to the first plurality of intensity values occurs at a plurality of exposed "patch portions" on the photoreceptor surface. Likewise, substep (ii) of the second potential detecting step recites successively exposing a surface portion of the photoreceptor with laser light corresponding to the second plurality of intensity values to provide a plurality of patch portions on the photoreceptor surface. Appellant's preferred examples of "patch" portions are shown in

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Figure 2 where they are labeled A 1, A 2, A 3, A 4, A 5. They are discreet areas with spacing there-between so that reliable detection can be made of the potential existing at each of these exposed "patch" portions, after the portions have been exposed with laser light of a given intensity. Claims 12 and 13 recite further details of the "patch" portions introduced in claim 6.

Neither the AAPA nor the Arevalo patent would have taught or suggested exposure of the photoreceptor surface in a way to create Appellant's recited plurality of "exposed patch portions." As such, the Sugiyama, et al. patent has been asserted as remedying the deficiencies of the AAPA and Arevalo, with respect to this requirement of claim 6. Sugiyama, et al. also has been asserted as rendering the subject matter of dependent claims 12 and 13 obvious.

The Sugiyama, et al. patent, however, does not remedy the fatal flaw in the rejection purporting to combine the AAPA with Arevalo. Nothing in Sugiyama, et al. would have suggested or motivated those of ordinary skill in the art to have applied the teachings of Arevalo to the potential correction technique in an image-forming apparatus as taught by the AAPA. Nothing in Sugiyama, et al. would have suggested the applicability of a method and apparatus for phase shifting (Arevalo) in the AAPA's image-forming apparatus correction procedure. There simply is no motivation to be found in the applied prior art to support their combination in the way that has been asserted against claim 6, and claims 12 and 13. Again, no proper *prima facie* case of obviousness has been established to sustain the rejection. The mere potential that patents could be combined or modified is insufficient, absent clear motivation provided by the cited references. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In

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re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). All limitations can not be met by the improper combination of the AAPA, Arevalo, and Sugiyama, et al. Therefore, again the rejection fails for lack of *prima facie* obviousness.

For the reasons set forth above, Appellant respectfully submits that the rejection under 35 U.S.C. § 103(a) of record is improper, and that the rejection of the claims is therefore overcome. Appellant therefore respectfully requests that the rejection of the Examiner be reversed.

Respectfully submitted,

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(10) Appendix

Pursuant to 37 C.F.R. §1.192(c)(9), this contains a clean copy of claims 6-13, the claims involved in this appeal.

6. A laser intensity adjusting method of adjusting a maximum intensity of a laser exposure mechanism for irradiating laser light to a surface of a photoreceptor to which a uniform potential is being given by a corona discharger, said method comprising:

a first potential detecting step including the steps of (i) obtaining a first plurality of laser intensity values that increase from an initial value to a predetermined value according to a first interval to provide a first range of intensity values, (ii) successively exposing a surface portion of the photoreceptor surface with laser light having intensities corresponding to said first plurality of intensity values to provide a plurality of exposed patch portions on the photoreceptor surface, and (iii) detecting the potential of each of said plurality of exposed patch portions;

a second potential detecting step including the steps of (i) obtaining a second plurality of laser intensity values that increase from an initial value to a predetermined value according to a second interval to provide a second range of intensity values, said second interval being smaller than said first interval and said second range being smaller than said first range, (ii) successively exposing a surface portion of said photoreceptor surface with laser light having intensities corresponding to said second plurality of intensity values to provide a plurality of patch portions on the photoreceptor surface; and (iii) detecting the potential of each of said plurality of exposed patch portions; and

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a step of setting, as a maximum intensity of the laser exposure mechanism, a laser intensity with which there has been detected, at said first or said second potential detecting step, a potential equal to or substantially equal to a predetermined set potential,

wherein said laser intensities corresponding to said second plurality of intensity values are selected to be close to a laser intensity value corresponding to a potential detected during said first potential detecting step as closest to said predetermined set potential.

7. A laser intensity adjusting method according to claim 6, wherein

said second potential detecting step is repeated until there is obtained a potential equal to or substantially equal to said predetermined set potential.

8. A laser intensity adjusting method according to claim 6, wherein

said laser intensity values obtained at first potential detecting step have values selected from a plurality of laser intensities obtained by dividing said predetermined laser intensity value of said first potential detecting step by a first predetermined number.

9. A laser intensity adjusting method according to claim 6, wherein

said laser intensity values obtained at said second potential detecting step have values selected from a plurality of laser intensities obtained by dividing said predetermined laser intensity value of said second potential detecting step by a second predetermined number.

10. A laser intensity adjusting method according to claim 8, wherein

said predetermined laser intensity value is set to a value which is greater than

a suitable maximum intensity.

11. A laser intensity adjusting method according to claim 9, wherein

said predetermined laser intensity value is set to a value which is greater

than a suitable maximum intensity.

12. A laser intensity adjusting method according to claim 6, wherein said exposed

patch portions are spaced apart from each other on the photoreceptor surface.

13. A laser intensity adjusting method according to claim 12, wherein said exposed

patch portions are generally rectangular areas on the photoreceptor.

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